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# CURVES FOR ESTIMATING THE FUEL CONSUMPTION OF AN AVIATION ENGINE ON THE BASIS OF PISTON DISPLACEMENT AND REVOLUTIONS PER MINUTE

(POWER PLANT SECTION REPORT)

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# CURVES FOR ESTIMATING THE FUEL CONSUMPTION OF AN AVIATION ENGINE ON THE BASIS OF PISTON DISPLACEMENT AND REVOLUTION PER MINUTE.

The accompanying curves have been drawn for the purpose of determining the correct full throttle fuel consumption for normal types of water-cooled aviation engines when only the piston displacement and revolutions per minute are known.

These curves should be particularly useful in adjusting the carburetor of an engine whose normal power output has not been determined, or which is run in a fuselage or on a test stand not equipped for measuring power.

The assumptions used in making calculations for the curves are as follows:

Volumetric efficiency, 0.85.
Ratio of air to fuel, by weight, 15.
Barometer, 29.92 in. hg.
Atmospheric temperature, 60° F.

Using the above assumption, the equation for these curves is as follows:

$$F = N\,D \times .000075.$$

where:

F=fuel consumption, pounds per hour.
N=revolutions per minute of engine.
D=piston displacement, cubic inches.

It has been found that these curves agree very closely with results obtained with water-cooled aviation engines having a compression ratio between 5.0 and 5.5:1 and using normal carburetor settings.

These curves are also correct for the assumptions:

Volumetric efficiency, 0.80.
Ratio of air to fuel, 14.
Air density, pounds per cubic foot, 0.076.

For other assumptions of volumetric efficiency, air density and mixture ratio, the following formula may be used:

$$F = \frac{END d}{R} \times 0.0174$$

where:

E=Volumetric efficiency, expressed as a decimal.
R=Ratio of air to fuel by weight.
d=Air density, pounds per cubic foot.

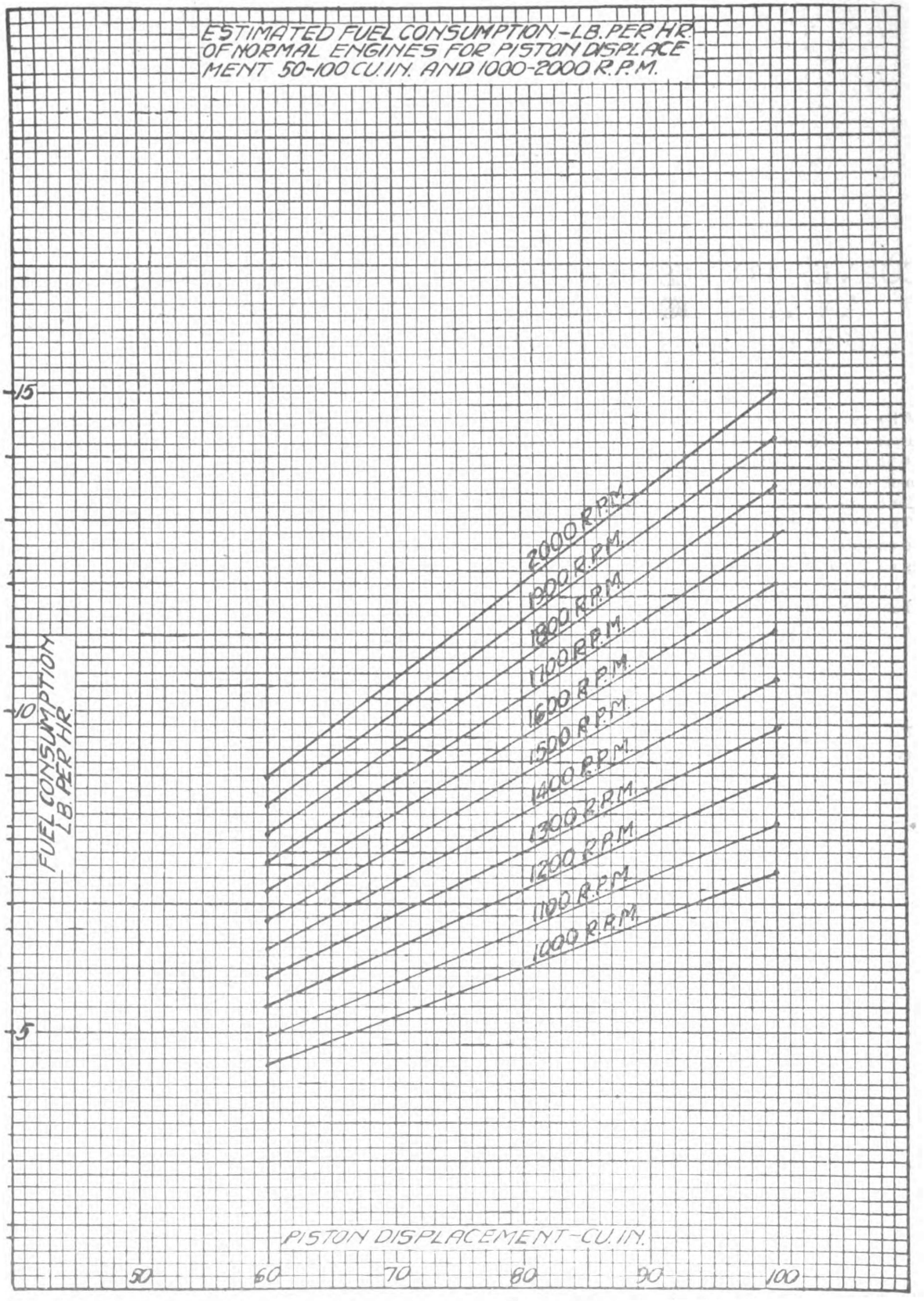


FIG. 1.

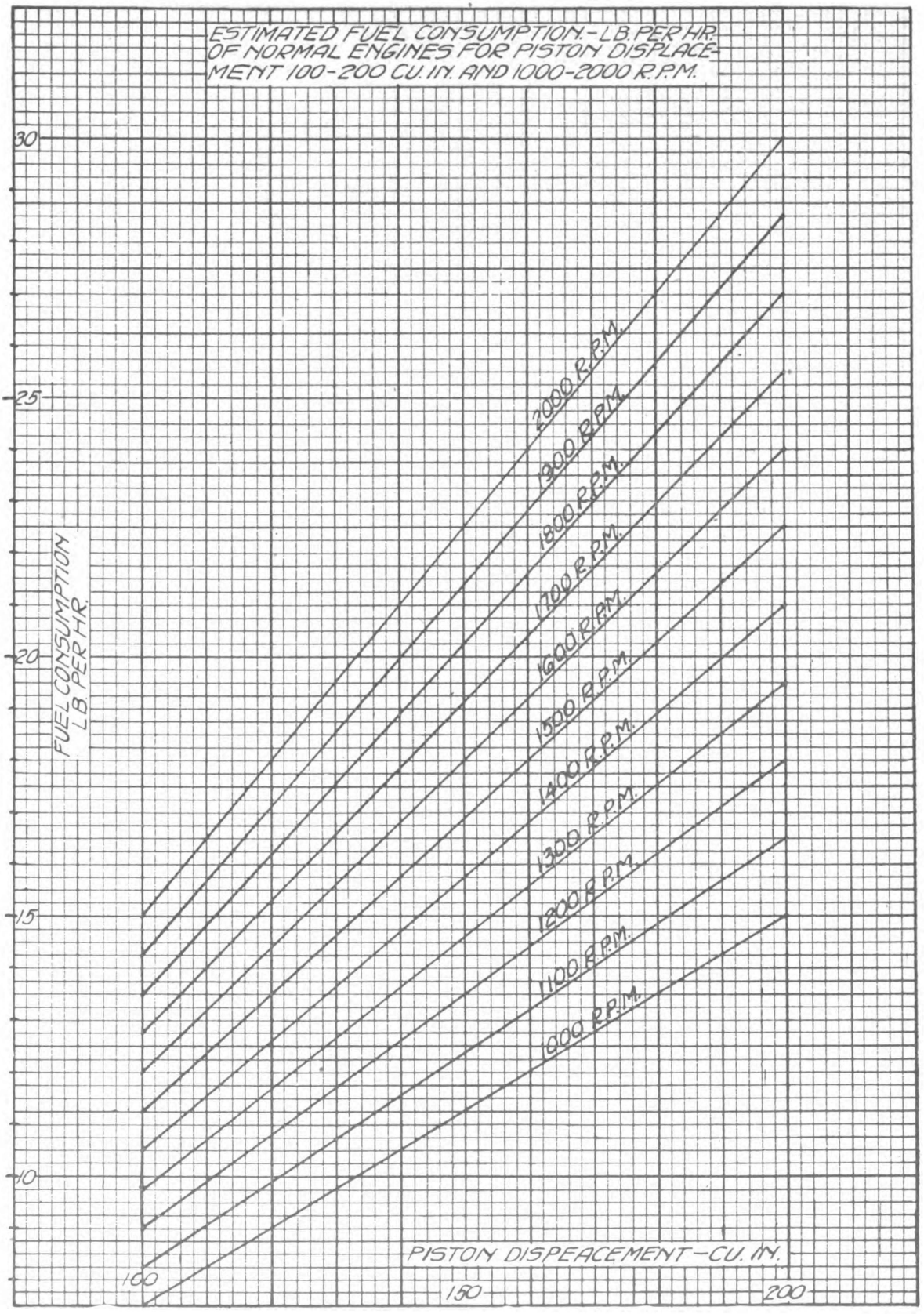


FIG. 2.

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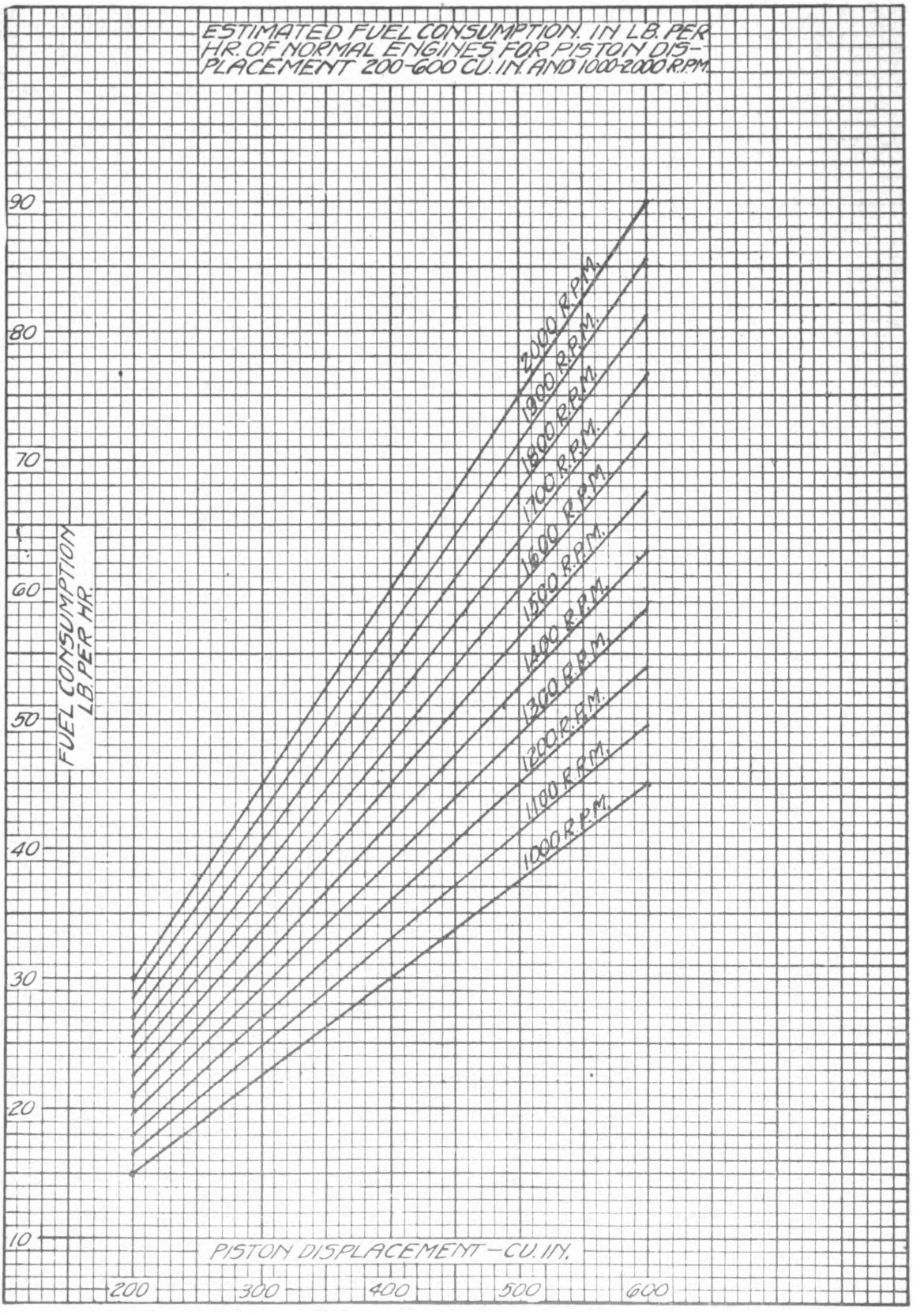


FIG. 3.

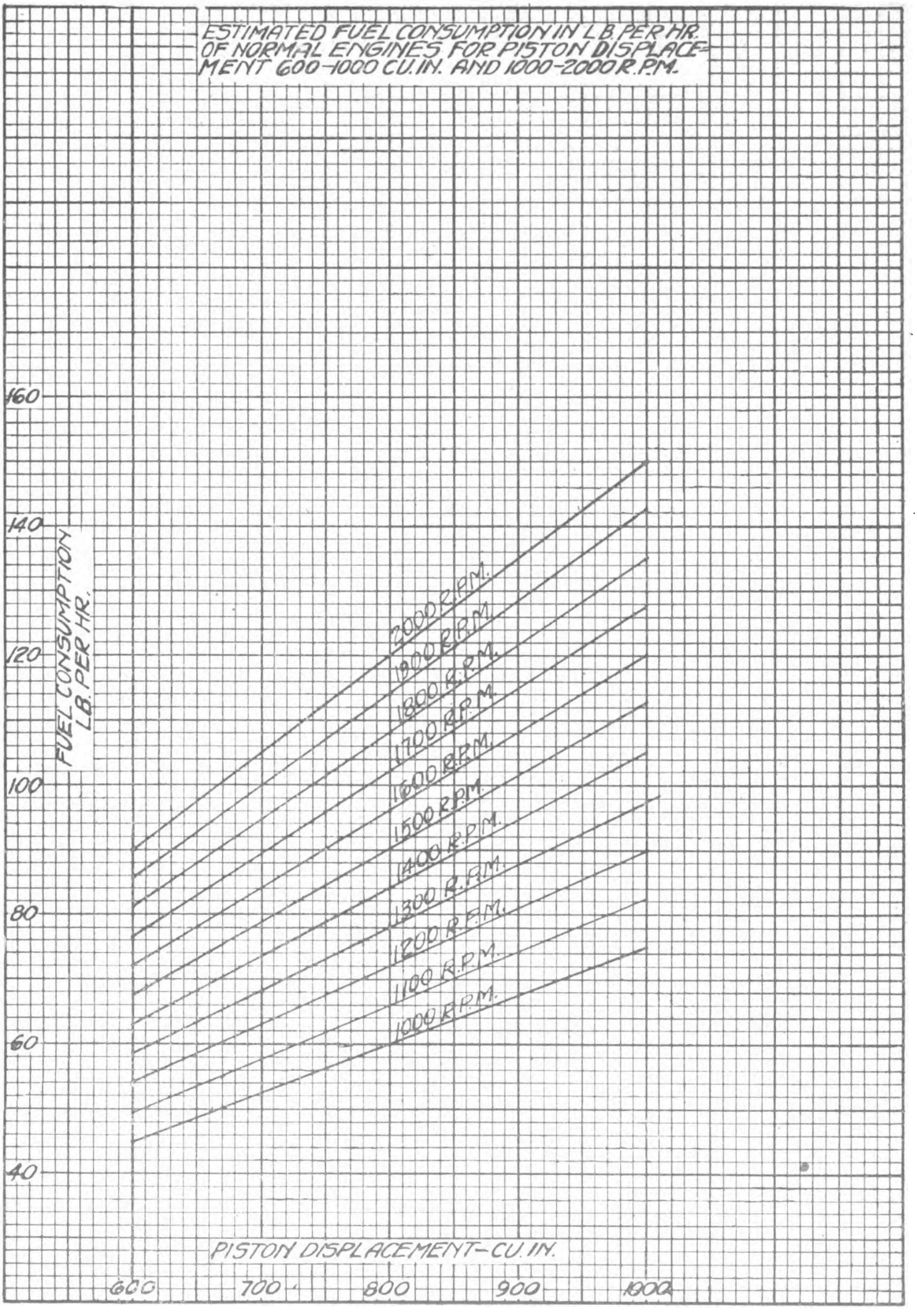


FIG. 4.

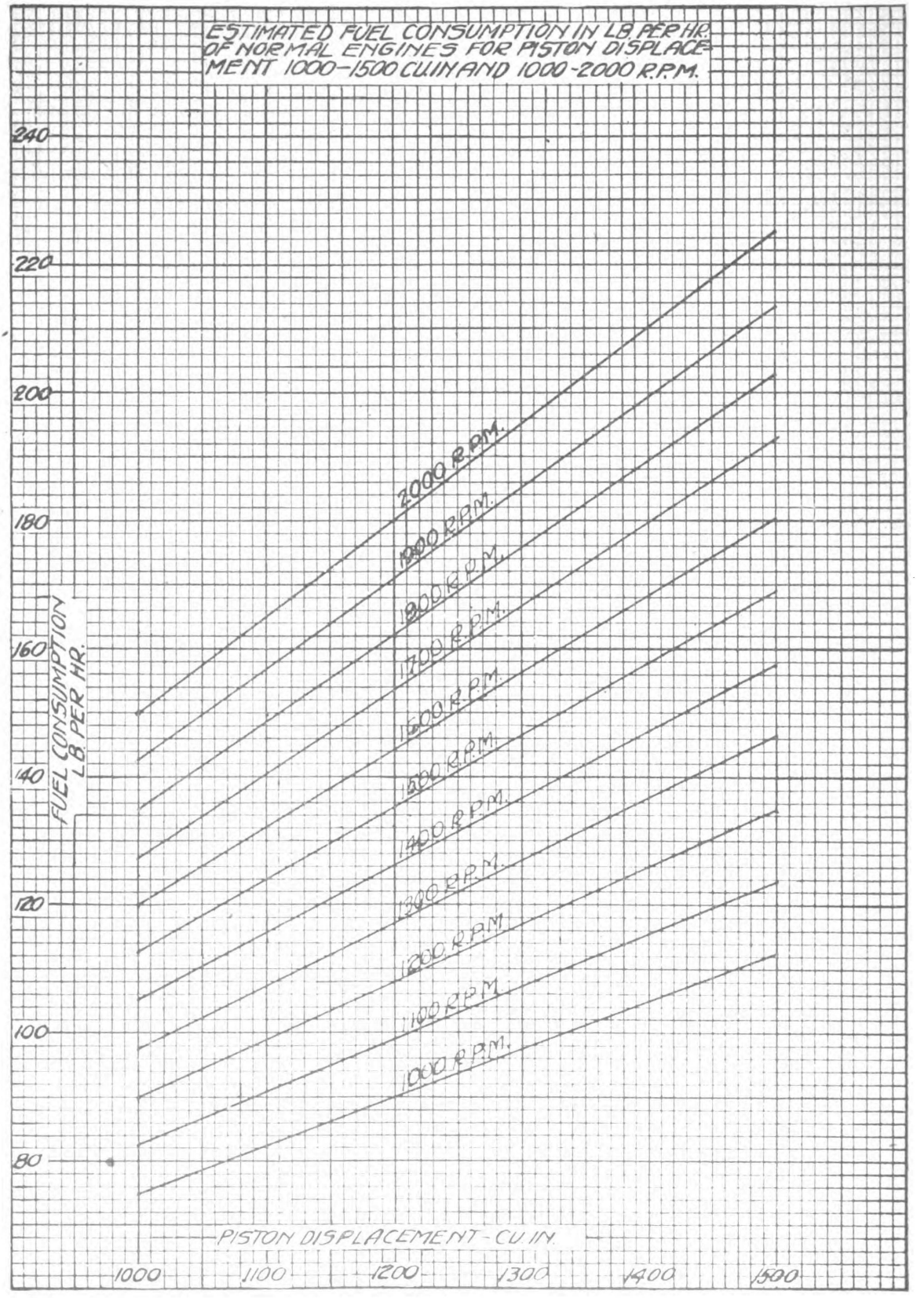


FIG. 5.

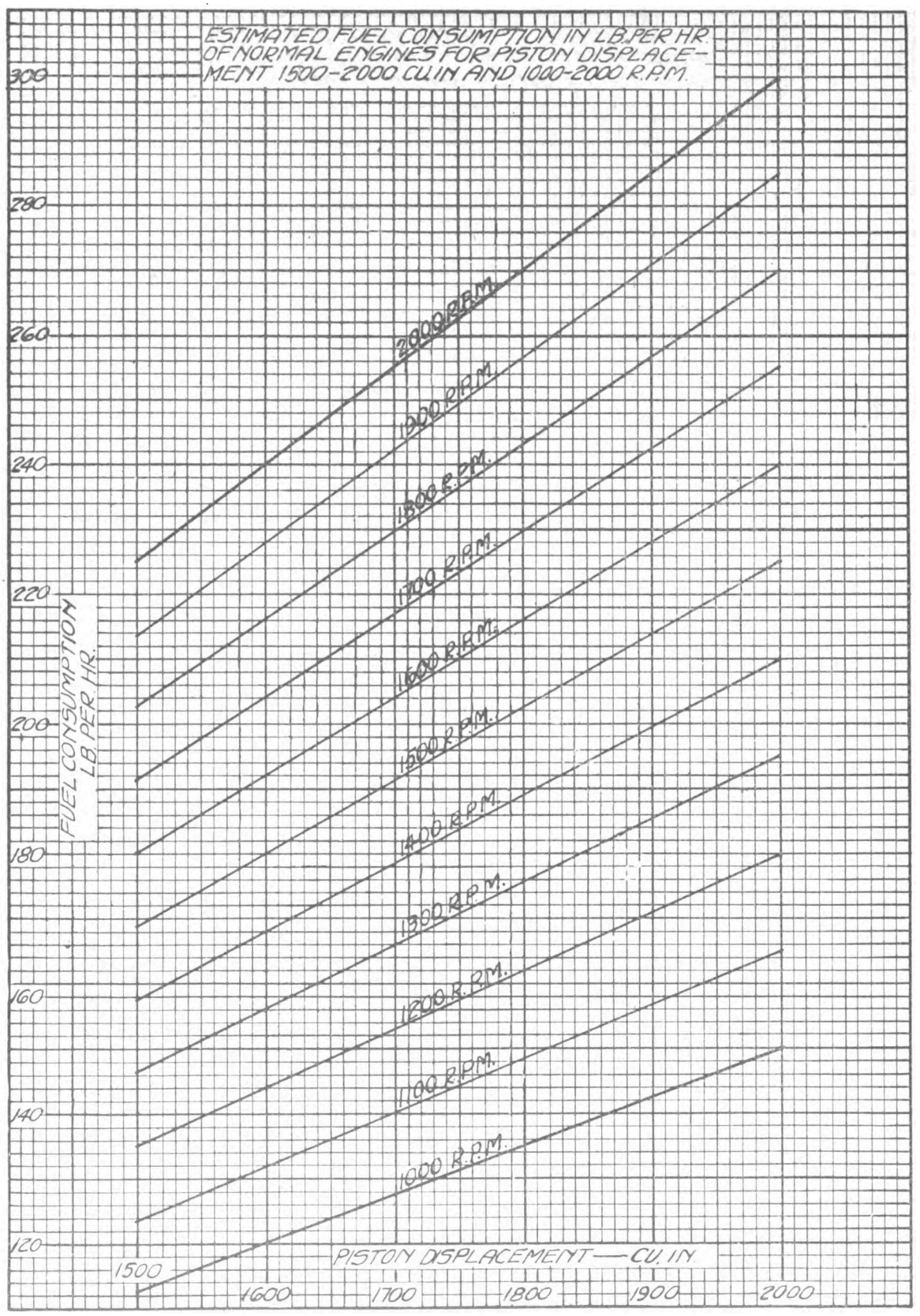


FIG. 6.

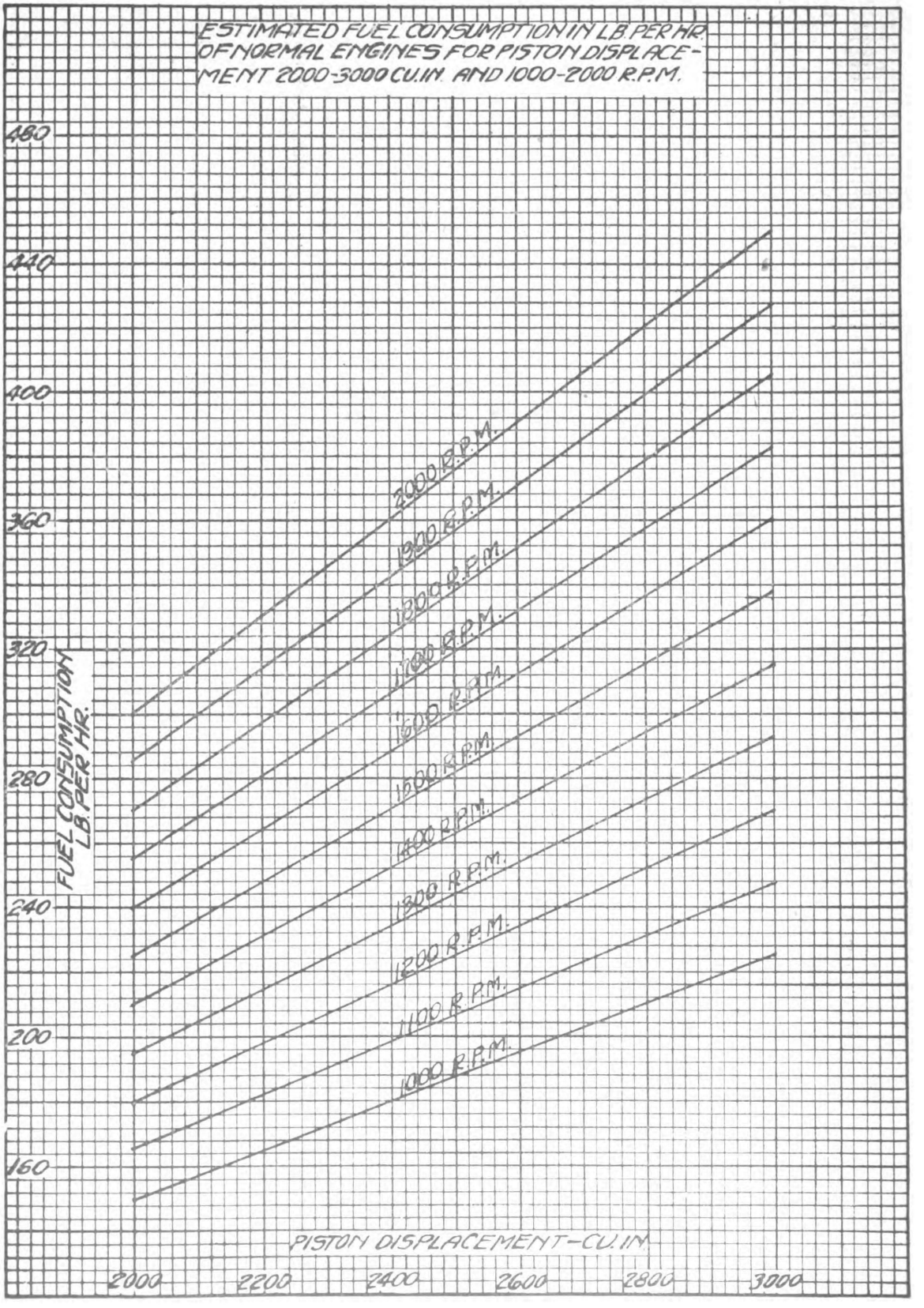


FIG. 7.